

# Transportation Research Quarterly

Providing highlight of MassDOT's transportation research activities and other helpful information.

Summer 2021

## Focused on Research

The Massachusetts [Strategic Highway Safety Plan](#) (SHSP) is a statewide coordinated safety plan providing a comprehensive framework for reducing fatal and serious injury crashes on all public roads. The Plan identifies the State's key safety needs and guides investment toward the strategies and countermeasures with the greatest potential to save lives and prevent injuries. This issue highlights four ongoing research projects evaluating the effectiveness of several strategies that have been identified and implemented for multiple emphasis areas within the SHSP, including speeding, trucks, and intersection safety, as well as early incident detection and response. Research results help to guide development of future effective strategies as we kick off the development of the 2022 SHSP.

Bonnie Polin, State Safety Engineer, MassDOT Highway Division

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## Research Provides Data-Driven Evidence for Implementing and Updating Massachusetts Strategic Highway Safety Plan (SHSP)

The Commonwealth has a long-term vision of working toward zero roadway fatalities and serious injuries. To achieve this vision, MassDOT has been developing five-Year Strategic Highway Safety Plans (SHSP) since 2006 in accordance with FHWA requirements. Resulting from the joint efforts of more than fifty agency partners, [the 2018 SHSP](#) identified fourteen Emphasis Areas (EA), established appropriate interim goals, and developed effective strategies and actions. Designated teams comprised of partner agencies are addressing EAs directly through roadway projects, design guideline updates, permitting, road use safety education, legislative and enforcement actions. To support their efforts, SPR-funded research has examined selected safety strategies and actions. Most of the research projects are directly commissioned by MassDOT and steered by our lead Subject Matter Experts, while some are conducted via [transportation pooled fund](#) (TPF) program in partnership with FHWA and other state DOTs.

Emphasis Area	Recent MassDOT SPRII Research	TPF
1. Lane Departure Crashes	Completed	Ongoing
2. Impaired Driving		
3. Occupant Protection	Ongoing	
4. Speeding and Aggressive Driving	Ongoing	
5. Intersection Crashes	Ongoing	
6. Pedestrians	Completed	Ongoing
7. Older Drivers	Completed	
8. Motorcycle Crashes		Ongoing
9. Younger Drivers		
10. Large Truck-Involved Crashes	Ongoing	
11. Driver Distraction	Ongoing	
12. Bicyclists	Ongoing	
13. Work Zone Safety	Ongoing	
14. At-Grade Rail Crossings		

## Ongoing Safety Research Highlights

### Evaluating the Safety Impacts of Flashing Yellow Permissive Left-Turn Indications in Massachusetts

MassDOT recently implemented Flashing Yellow Arrow (FYA) traffic control device at over 350 intersections with aim to reduce intersection crashes. This research evaluated the safety impacts of the FYA left-turn indication through an in-depth before/after implementation crash analysis and benefit-to-cost ratio. Results provided overwhelming evidence that FYA reduces the annual number of injury-related crashes and lowers economic costs due to injuries. Read the [Research summary](#) cut sheet for further information.

Principal Investigators: Francis Tainter, Cole Fitzpatrick & Michael Knodler Jr., UMass Amherst

Project Champion: James Danila, MassDOT Highway

Project Manager: Drew Pflaumer, MassDOT OTP



### Using Traffic Signals to Reduce Speeding Opportunities

Preventing speeding on multilane arterials is critical to safety. Traffic signal timing can be adjusted to reduce incidence of dangerous speeding by removing opportunities to drive at high speeds through multiple intersections. This project aims to develop an online software tool that enables traffic engineers to estimate the number of speeding opportunities a traffic signal timing plan produces and allow engineers to develop and choose timing plans that improve safety while still supporting desirable traffic flow in a corridor. A companion guidebook will also be delivered as part of the final products. Read the [Research in Progress](#) cut sheet for further information.

Principal Investigator: Peter Furth, Northeastern University

Project Champion: James Danila, MassDOT Highway

Project Manager: Michael Flanary, MassDOT OTP



### Uncovering the Root Causes to Truck Rollover Crashes on Ramps

Nationwide, approximately 11% of total truck crashes were on highway ramps and about half of them involved rollovers. By utilizing traffic cameras and advanced video analytics tools, this project intends to uncover the causes of truck rollovers on highway ramps and derive surrogate safety performance measures. It also aims to discern any correlations between truck rollovers and ITS devices, signage and markings, and roadway design practices. Read the [Research in Progress](#) cut sheet for further information.

Principal Investigators: Yuanchang Xie & Benyuan Liu, UMass Lowell; Chengbo Ai, UMass Amherst

Project Champions: Bonnie Polin, MassDOT Highway & Jeffrey DeCarlo, MassDOT Aeronautics

Project Manager: Drew Pflaumer, MassDOT OTP



### Multisource Data Fusion for Real-Time and Accurate Traffic Incident Detection

Traffic incidents are a leading contributor to nonrecurring congestion and secondary crashes. Once formed, traffic queues are difficult to dissipate and return to normal operations. Real-time and accurate incident detection plays a critical role in Traffic Incident Management (TIM) and congestion mitigation. This project investigates how to integrate data from multiple sources for early incident detection and identifies the algorithms to be used for setting the "trigger points" for Highway Operation Center to dispatch first responders. Read the [Research in Progress](#) cut sheet for further information.

Principal Investigators: Chronis Stamatiadis, Yuanchang Xie & Nathan Gartner, UMass Lowell

Project Champion: Chester Osbourne, MassDOT Highway

Project Manager: Mike Flanary, MassDOT OTP



## A Look at Who We are – Team Highlights

Each MassDOT research project is supported by a team comprised of a Project Champion, a Principal Investigator and a Project Manager. Often, the research project team will also include staff from the UMass Transportation Center (UMTC) who provide general support services to the Principal Investigator. Highlighted below are the key team members of the “Multisource Data Fusion for Real-time and Accurate Traffic Incident Detection” project.

### Project Manager – Mike Flanary

*A MassDOT Research Project Manager (PM) is responsible for the administrative management and overall coordination of an assigned research project.*

Mike Flanary is a transportation planner with the Research Section at the Office of Transportation Planning. He joined MassDOT in September 2019 after graduating from Tufts University with a Master’s in Urban and Environmental Policy and Planning. Prior to working at MassDOT, Mike worked at Tufts University and had internships with Conservation Law Foundation, the Martha’s Vineyard Commission, and the City of Cambridge, MA. He is an avid cyclist and greatly enjoys riding his e-bike around Boston. You may contact him at [Michael.Flanary@dot.state.ma.us](mailto:Michael.Flanary@dot.state.ma.us).



### Project Champion – Chester Osborne

*A Project Champion (PC) is a MassDOT subject matter expert, the proponent of a funded research project, and the technical advisor for project development, completion and implementation.*

Chester Osborne currently serves as MassDOT’s first Director of Transportation System Management and Operations (TSMO) where he works as part of a cross cutting innovate team to develop a TSMO program of record and excellence and a fellow with the AASHTO National Operations Center of Excellence. After joining MassDOT in 2012, Chet worked as Telecommunications Technician supporting the MHS Tunnel System, a grant writer and trainer for MassDOT U Safety & Security Institute, and a key HOC member. Chet is also an US Army veteran with 20 years of service history. He holds a Masters of Public Administration, a graduate certificate in Transportation & Urban Systems, and a certificate of Enterprise Management from the Joint Special Operations University. He has also attended the Eastern States Transportation Coalition senior operations management academy and the freight academy.



### Principal Investigator – Polichronis Stamatiadis

*The Principal Investigator (PI) is responsible for submitting an interest statement, developing a detailed research scope if selected, and conducting research activities per project scope.*

Dr. Chronis Stamatiadis is an Associate Professor of Civil and Environmental Engineering at the University of Massachusetts, Lowell. He earned his Ph.D. from Michigan State University. His main research areas are in traffic operation, traffic control, traffic flow theory and characteristic, and connected and autonomous vehicles. He has extensive experience with ITS, traffic data analytics, and traffic control. He was intimately involved in the development of well-known network-wide traffic control strategies such as MULTIBAND, RT-TRACS and VFC-OPAC. He has conducted studies for many transportation entities, including a recent research for MassDOT on traveler information programs and operations and traffic data availability and reliability.



### UMASS Transportation Center – Tracy Zafian

Tracy has over 20 years of experience as a transportation researcher and planner, including for local and regional governments and in academia. She’s a Research Fellow at the UMass Transportation Center (UMTC), where she helps support MassDOT and UMTC transportation research projects, connections between MassDOT and researchers, and the dissemination of research through MassDOT conferences, webinars, and other venues. Prior to joining the UMTC, Tracy served as the lab manager at the UMass Human Performance Lab which conducts driving simulator and on-road driving safety and human factors studies. At UMass she has conducted driver research, and recently published a study in the journal Accident Analysis and Prevention on improving older driver safety during left turns at intersections. Tracy is a licensed driving instructor and has graduate degrees from MIT (M.S. in Transportation) and the University of Wisconsin (M.S. in Urban and Regional Planning).





## News and Events



**December 7-9, 2021**  
**8:45 am – 1 pm**  
**Location: Virtual**

For over 20 years, the MassDOT Moving Together Conference has brought together transportation leaders and practitioners involved in the areas of planning, public health, bicyclist and pedestrian safety, transit, advocacy, elected office, law enforcement and education to discuss and promote healthy and environmentally friendly transportation options such as walking, biking, and use of public transportation services, while ensuring safety and equality to all travelers.

This year's virtual conference session tracks will include:

- \* Shared roadway infrastructure
- \* Supporting our municipalities
- \* Equity in mobility
- \* Safe and sustainable in mobility
- \* Virtual site visits.

Visit the [2021 Moving Together Conference Website](#) to register and for the latest conference program and keynote speaker information.



**Spotlight Theme: Innovating an Equitable, Resilient, Sustainable, and Safe Transportation System**

The [Transportation Research Board \(TRB\) 101st Annual Meeting](#) will be held in person in Washington, D.C. January 9-13, 2022. with 868 sessions and workshops, the event is expected to attract thousands of transportation professionals from around the world. The [meeting program](#) covers all transportation modes, with sessions and workshops addressing topics of interest to policy makers, administrators, practitioners, researchers, and representatives of government, industry, and academic institutions. U.S. Transportation Secretary Pete Buttigieg will speak at the Chair's Plenary Session.

**2022 Event Dates: January 9-13**  
**Location: Walter E. Washington Convention Center**

Visit [TRB 2022 Annual Meeting Website](#)  
 Create a [MyTRB](#) account to access free TRB resources



**Propose New Topics for the FY 2023 NCHRP Synthesis Program by February 17, 2022**

View [online submission instructions](#).

Visit [NCHRP website](#) for information and research reports.

State DOTs are the sole sponsors of the AASHTO National Cooperative Highway Research Program (NCHRP) and continue to be the driving force behind NCHRP research. The program is operated in partnership with AASHTO under a cooperative agreement with FHWA and is administered by TRB. MassDOT contributes 5.5% of its available FHWA SPR funds to NCHRP; and our subject matter experts (SMEs) presently serve on over 40 NCHRP project panels. Each year, the AASHTO Research and Innovation Committee (R&I) invites state DOTs, AASHTO committee and council chairs, and FHWA to submit problem statements as well as topics for Synthesis projects. The Research Section coordinates and submits our agency's review of candidate problem statements, and the results from 50 states serve as the basis for AASHTO R&I funding decisions.



## 2021 NCHRP Reports and Web-only Documents with Safety Focus

### NCHRP Research Reports

Issue 974	<a href="#">Application of Crash Modification Factors for Access Management, Volume 1: Practitioner's Guide</a>
Issue 974	<a href="#">Application of Crash Modification Factors for Access Management, Volume 2: Research Overview</a>
Issue 968	<a href="#">LED Roadway Lighting: Impact on Driver Sleep Health and Alertness</a>
Issue 958	<a href="#">Diverging Diamond Interchange Informational Guide, Second Edition</a>
Issue 966	<a href="#">Posted Speed Limit Setting Procedure and Tool: User Guide</a>
Issue 948	<a href="#">Guide for Pedestrian and Bicyclist Safety at Alternative and Other Intersections and Interchanges</a>
Issue 876	<a href="#">Guidelines for Integrating Safety and Cost-Effectiveness into Resurfacing, Restoration, and Rehabilitation (3R) Projects</a>

### NCHRP Synthesis of Highway Practice

Issue 574	<a href="#">Temporary Pavement Markings Placement and Removal Practices in Work Zones</a>
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### NCHRP Web-Only Documents

Issue 310	<a href="#">Evaluation and Synthesis of Connected Vehicle Communication Technologies</a>
Issue 307	<a href="#">Recommended Guidelines for the Selection of Test Levels 2 Through 5 Bridge Railings</a>
Issue 306	<a href="#">Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges</a>
Issue 304	<a href="#">Criteria for Restoration of Longitudinal Barriers, Phase II</a>
Issue 302	<a href="#">Development of a Comprehensive Approach for Serious Traffic Crash Injury Measurement and Reporting Systems</a>
Issue 300	<a href="#">Guidance to Predict and Mitigate Dynamic Hydroplaning on Roadways</a>
Issue 297	<a href="#">Intersection Crash Prediction Methods for the Highway Safety Manual</a>
Issue 296	<a href="#">Guidelines for Cost-Effective Safety Treatments of Roadside Ditches</a>
Issue 295	<a href="#">Improved Prediction Models for Crash Types and Crash Severities</a>
Issue 292	<a href="#">Roadside Hardware Replacement Analysis: User Guide</a>
Issue 291	<a href="#">Development of Posted Speed Limit Setting Procedure and Tool</a>
Issue 244	<a href="#">Developing Guidelines for Integrating Safety and Cost-Effectiveness into Resurfacing, Restoration, and Rehabilitation (3R) Projects</a>

### NCHRP Implementation Support Program

The benefits from NCHRP project findings truly begin with implementation by state DOTs and other transportation agencies. To ensure that the research products are viable, NCHRP considers implementation throughout the course of a project—from the development of the problem statement to the awarding of the research contract and beyond to the completion of the research. As a part of NCHRP Project 20-44, the NCHRP Implementation Support Program has funding to facilitate implementation of NCHRP research results. If you believe certain NCHRP research products have implementation potential at MassDOT, please consult with your supervisor and then contact the Research Section to put forward an NCHRP 20-44 implementation support application. With NCHRP funds and consultant support, possible implementation products and activities may include:



Demonstration or pilot projects



Workshops or peer exchanges



Training



Flyers, brochures or videos for specific target audiences



Briefing materials for senior management

## Research Resources

### In Progress MassDOT Research

	<u>Start Date</u>
• <a href="#">Development of Comprehensive Inspection Protocols for Deteriorated Steel Beam End</a>	February 2020
• <a href="#">A Pavement Marking Inventory and Condition Assessment Method Using Mobile Lidar</a>	March 2020
• <a href="#">Understanding the Asset Management Systems Utilized by Municipalities in Massachusetts</a>	April 2020
• <a href="#">Impact of Advanced Driver Assistance System on Road Safety</a>	June 2020
• <a href="#">3D Printing Application for Transportation Infrastructure and Maintenance</a>	June 2020
• <a href="#">Detecting Subsurface Voids using UAS Infrared Thermal Imaging</a>	November 2020
• <a href="#">Automated Guardrail Inventory and Condition Assessment</a>	January 2021
• <a href="#">A UAS Network for Transportation Emergency Response</a>	March 2021
• <a href="#">Discover the Root Causes for Truck Rollover at Highway Ramps</a>	March 2021
• <a href="#">Massachusetts Depth to Bedrock</a>	March 2021
• <a href="#">Massachusetts-Specific Trip Generation Rates</a>	March 2021
• <a href="#">Multisource Data Fusion for Traffic Incident Detection</a>	April 2021
• <a href="#">Accessibility to Public Health</a>	May 2021
• <a href="#">Revised Load Rating Procedures for Prestressed Concrete Beams</a>	May 2021
• <a href="#">Post-Fire Damage Inspection of Concrete Structures (Phase II) – Experimental Phase</a>	June 2021
• <a href="#">Using Traffic Signals to Reduce Speeding Opportunities</a>	July 2021
• <a href="#">Optimizing MassDOT's High Performance Asphalt Overlay Mixtures</a>	July 2021
• <a href="#">Construction and Material Best Practices for Concrete Sidewalk Phase II – Hot Placement</a>	July 2021
• <a href="#">Implementing AASHTO Mechanist-Empirical Pavement Design Guide Phase II</a>	July 2021
• <a href="#">Mycofiltration Design and Treatment Option</a>	August 2021
• <a href="#">Ultra High-Performance Concrete Reinforced with Multi-scale Hybrid Fibers</a>	August 2021
• <a href="#">Safety Impacts of Yellow Flashing Permissive Left-Turn Indications – Approach Analysis</a>	October 2021

### Completed MassDOT Research

	<u>Completion Date</u>
• <a href="#">Best Practices for Cost Recovery</a>	October 2021
• <a href="#">Exploring Short-Sea Shipping as an Alternative to Non-Bulk Freight Trucking in Southeastern MA</a>	September 2021
• <a href="#">Improving Load Rating Procedures for Steel Beam Ends with Deteriorated Stiffeners</a>	September 2021
• <a href="#">Effectiveness of Bike Boxes in Massachusetts</a>	September 2021
• <a href="#">Energy Consumption, Cost and Emissions of MBTA Rapid Transit Vehicles</a>	August 2021
• <a href="#">Flexible Transit Services in Rural Areas</a>	August 2021
• <a href="#">Future of Commonwealth's Curb</a>	June 2021
• <a href="#">Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide (Phase I)</a>	June 2021
• <a href="#">Translating Data Generated by the Transit App into Insights on Transportation Use</a>	May 2021
• <a href="#">Post-fire Damage Inspection of Concrete Structure (Phase I)</a>	April 2021
• <a href="#">Construction and Materials Best Practices for Concrete Sidewalks (Phase I)</a>	March 2021
• <a href="#">Impacts of Flashing Yellow Permissive Left-Turn Indications in Massachusetts</a>	March 2021
• <a href="#">Characterization of Reclaimed Asphalt Pavement for HMA Surface Courses in Massachusetts</a>	August 2020
• <a href="#">Compost Blankets for Erosion Control and Vegetation Establishment</a>	May 2020
• <a href="#">Public Health Assessment for Transportation Projects</a>	March 2020

### Additional Resources

[Transportation Research and Information Database \(TRID\)](#) is a comprehensive bibliographic database containing more than 1.2 million records of transportation research.

[Research in Progress \(RiP\) Database](#) contains information on more than 13,000 current or recently completed federally-funded transportation research projects.

[AASHTO Publications](#) include the most accepted technical guides, specifications, and manuals of the industry.

### Contact Us

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